Naval War College
Newport, R.I.

# The Impact of Emerging Technology

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and not necessarily endorsed by the Naval War College or the Department of Navy.

Signature: _____

16 May 2000

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REPORT DOCUMENTATION PAGE

| | |
|---|---|
| **1. Report Security Classification:** UNCLASSIFIED | |
| **2. Security Classification Authority:** | |
| **3. Declassification/Downgrading Schedule:** | |
| **4. Distribution/Availability of Report:** DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED. | |
| **5. Name of Performing Organization:** JOINT MILITARY OPERATIONS DEPARTMENT | |
| **6. Office Symbol:** C | **7. Address:** NAVAL WAR COLLEGE<br>686 CUSHING ROAD<br>NEWPORT, RI 02841-1207 |
| **8. Title** (Include Security Classification): Impact of Emerging Technology (U) | |
| **9. Personal Authors:** Michael E. Groody<br>CDR USN | |
| **10. Type of Report:** FINAL | **11. Date of Report:** 16 May 2000 |
| **12. Page Count:** 18 | **12A Paper Advisor (if any): CAPT D. Scott Thompson** |

**13. Supplementary Notation:** A paper submitted to the Faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.

**14. Ten key words that relate to your paper:**

| | |
|---|---|
| Emerging Technology | Real-time video |
| Intelligence | Command and Control |
| OPERATION ALLIED FORCE | Mogadishu |
| Flex Targeting | ISR |
| Change | UAV |

**15. Abstract:**

As a result of the modernization of C2 systems, the operational commander is faced with changing his approach to the historic functions of intelligence and C2. The question arises, is a change required? The operational functions performed by a CINC in today's military can still be carried out in a historic manner in the dynamic environment of emerging technology. Instant information should not be confused with instant intelligence. The CINC does not need second by second information systems unless it provides strategic or operational significance. The value of utilizing this technology demands risk versus reward analysis considerations. Emerging technological advances of today's military should not be discarded simply for the sake of keeping the status quo. The advances should be evaluated and applied at the appropriate level once a value-added determination has been assessed.

| **16. Distribution / Availability of Abstract:** | **Unclassified** | **Same As Rpt** | **DTIC Users** |
|---|---|---|---|
| | X | | |

| | |
|---|---|
| **17. Abstract Security Classification:** UNCLASSIFIED | |
| **18. Name of Responsible Individual:** CHAIRMAN, JOINT MILITARY OPERATIONS DEPARTMENT | |
| **19. Telephone:** 841-6461 | **20. Office Symbol:** C |

**Security Classification of This Page** Unclassified

# The Impact of Emerging Technology


## *Abstract*

Army leadership has expressed the opinion that the lessons learned from Kosovo have sent an important message. The time has come to stop speaking of "timely" or "near real-time" intelligence and start speaking of "immediate intelligence. [1] The plan of top Navy leadership is to have forces integrated into networked command and control (C2) systems, capable of providing a common tactical picture of the battlespace to all commanders. These systems will be fully interoperable with joint command systems. This network will achieve faster speed of command and closer joint integration, ensuring that the warrior has the right information in the optimum display for immediate action.[2] As a result of the modernization of C2 systems, the operational commander is faced with changing his approach to the historic functions of intelligence and C2. The question arises, is a change required?

The value of the increasing speed in decision making for the commander, due to higher information flow is being debated with the emergence of Network Centric Warfare and Digitalization of the Battlefield concepts. Innovation and changes in technology are a constant. The fundamental issue is how the operational commander should utilize this increased data. A joint unified Commander in Chief (CINC) should provide the strategy and vision required in his area of responsibility. Historically, the combatant CINC has provided operational guidance and delegated the execution of the operations to the tactical commander. The operational functions performed by a CINC in today's military can still be carried out in a historic manner in the dynamic environment of emerging technology. Instant information should not be confused with instant intelligence. The CINC does not need second by second information systems unless it provides strategic or operational significance. The value of utilizing this technology demands risk versus reward analysis considerations. The operational level decision maker should use emerging technology with caution and not make drastic changes in his approach to war fighting.

## *Philosophy of C2 and Intelligence - the Evolving Positions*

Each of the services has addressed an understanding of emerging information technology and the need to adapt a change of philosophy. Researching each service along with the joint position has produced interesting similarities and comparisons.

The revised Army doctrine of FM 100-5 states that commanders need to devise their battlefield framework on the ground. With a goal of accomplishing the mission at least cost, a specific network of mission, enemy, terrain, troops and time available (METT-T) circumstances should be utilized. One of the new concepts in the conduct of operations is battle command. This concept has the commander, instead of the command post as the center focus. Combat power can be generated from wherever the commander needs to be on the battlefield. Within the demands of the modern battlefield, there will be a need to rapidly evolve from a process-oriented method of commanding forces, to one in which commanders and smaller staffs have rapid access to information and intelligence when they need it, from wherever they choose on a battlefield.[3]

The Navy believes superior speed of command enhances the advantages of operating from the sea. Speed of command is the ability to rapidly collect information, assess the situation, develop a course of action, and immediately execute with overwhelming effect. Just as in the modern high-tech market place, speed of command achieves disproportionately larger returns for relatively modest, but precisely placed, initial investments. This capability is characterized by extraordinarily high rates of change that lock out enemy solutions, while locking in our success.[4]

When discussing intelligence functions, the Marine Corps believes the high tempo of operations essential to successful Operational Maneuver from the Sea (OMFTS) requires information to be provided to decision makers with a minimum of delay. Technology that permits the rapid dissemination of intelligence products will play an important role in this effort. In another opinion, the C2 systems best suited to OMFTS will be very different from those developed to deal with previous approaches to amphibious warfare. Techniques previously employed to compensate for the inability of fire support units to see the battlefield will give way to techniques that enhance combatants ability to be informed better than ever before. Communication systems designed to provide a few headquarters with an overall view of the

situation will have to be replaced by those that provide units with control over the information they need. The key to this capability lies more in the realm of education and doctrine than it does in the realm of hardware.[5]

New technology in the Air Force, along with new operational concepts, already offer an alternative to the kind of military operation that pits large numbers of young Americans against an adversary in brute, force-on-force conflicts. This new way of war leverages technologically superior US military capabilities to achieve national objectives. In no other area is the pace and extent of technological change as great as in the realm of information. The Air Force is committed to providing the integrated global, theater, space and surface picture of the battlespace to the 21st century joint force commander. Moreover, its future Battlespace Management/Command and Control systems will enable real-time control and execution of all air and space missions.[6]

From the joint perspective, a general statement from Joint Pub 1-0 summarizes the need to adapt. Joint forces on land, at sea and in the air, now reinforce and complement each other more than ever. The speed of communication and pace of events in the modern world have accelerated. Joint teams must be trained and ready prior to conflict. The demands of fighting both as an industrial and postindustrial power place a premium on well-educated, professional men and women who have mastered the tools of modern warfare, while maintaining the traditional fighting spirit of the Armed forces of the United States.[7]

Each of these perspectives has merit. The leaders in the operational field are challenged to adapt to the changing technological advances that are available in today's culture. But, further analysis is required to understand what degree of adaptation is required at each level of command. Change is the constant. Adapting to change is a universally accepted prerequisite for success. Technological systems need continued research and development efforts and a "value-added" litmus test is required for each new system. If one level of command can benefit from this advance, it must also be understood that every level of command may not receive the same benefits.

Emerging technology is a broad topic that encompasses a massive amount of systems in today's military. Real-time video is one capability that can be discussed as a controversial new application typical of new technology in the Intelligence, Surveillance and Reconnaissance (ISR) field. Real-time video has grown over the years and continues to expand in scope and purpose. This evolving system pipes

information into the operational commander's decision making center. The large size of this pipe, or bandwidth that is required to provide video is the driving factor in evolving communications systems. The extensive video bandwidth requirement is the entering argument for today's expanding C2 architecture. Therefore, an analysis of how this video product is applied by the operational commander begins to explain the impact of emerging technology.

## ***Analysis***

*If you know the enemy and know yourself, you need not fear the result of a hundred battles. When you are ignorant of the enemy, but know yourself, your chances of winning and losing are equal. If ignorant of both your enemy and of yourself, you are certain in every battle to be in peril.* [8]

Advances in technology and information flow are essential to military operations in the 21st century, but a proper understanding needs to be accomplished before the operational commander can utilize raw forms of intelligence. To understand the difference between providing information flow and real-time intelligence, one should turn to a definition in Naval Doctrine Publication Two. Information is data, not fully analyzed, correlated or interpreted.[9] Real-time video to the commander falls into this category. Intelligence is the product resulting from the collection, exploitation, processing, integration, analysis, evaluation and interpretation of available information. [10]

The analysis of the evolution of this system will start with an early example of applying real-time video technology and progress through a recent operational battle experience. Each example starts with an overview of the situation and branches out to discuss the impact of emerging technology in real-time video.

## ***Battle of Mogadishu 1993***

In one of the longest and most unsuccessful firefights recorded since Vietnam, the Battle of Mogadishu will go down in history as a critical point in the evolution of intelligence and C2 operational functions. With a basic mission of abducting two top Somali warlords in the heart of an adversary's city

with advanced C2 technology, approximately one hundred elite US soldiers were the recipients of an unexpected series of enemy actions. The intelligence capabilities of the only superpower nation in the world were tried and tested with varying results. The evolution of technology allowed the commander of Task Force Ranger, Maj. General Garrison, to view the battle in real time from his headquarters, without the sound and smell of real combat. This new operational system was the result of emerging technology being fielded in battle without a thorough risk analysis being performed.

**Overview**

This analysis does not cover the entire operation, but instead focuses on two days of combat in Oct 1993. In an operation that was planned to be complete in an hour, members of Task Force Ranger were engaged in armed conflict for a period of 24 hours against thousands of heavily armed Somalis. The assault of the target building in mid afternoon on 3 OCT 1993 was planned to subdue a gathering of Habr Gidr leaders with the objective to abduct two of Mohamed Aidid's top aides. With members of the Army Rangers placed in surrounding locations in the vicinity of the target building, other members of the Special Operations (SPECOPS) units achieved the objective. Once the objective was seized, the departure from the area proved much more difficult than the original plans predicted. A simple return to the base turned into a long ordeal for all of the forces involved. With the US perception of unchallenged air superiority and total freedom to maneuver in the sky, the forces on the ground began to witness a different battle. The Somali militia forces rallied the civilian population to counter the US attack on their city. An armed helicopter was shot out of the sky by a Somali rocket propelled grenade (RPG). This event cracked the task force's false sense of invulnerability. The AH-6 Black Hawks and MH-6 Little Birds helicopters were the task force's trump card. With their feared fire power capabilities, they kept the savage mobs at a distance. [11] After the helicopter was shot down, the fog and friction of combat led the rescue convoy on a circuitous route that stranded some of the forces to battle the growing angry population of the city. Overhead of the forces there were C2 helicopters as well as a Maritime Patrol Aircraft (MPA) capable of filming and providing a real-time video live feed of the battle scene to the Joint Operations Center (JOC). In ordinary circumstances the convoy would have just barreled over to the downed helicopter running over and shooting through anything in its path. But with the help overhead, the Task Force Ranger was demonstrating how too much

information could hurt soldiers on a battlefield. The time delay associated with the overhead directions being relayed into the JOC and back out to the operator on the street caused numerous misdirected turns. Confusion on the battlefield, along with the untimely direction of forces, delayed the safe transport of the convoy. Aidid's objective was to kill Americans, weakening support for Somalia operations. He knew a downed helicopter would draw more Americans to rescue the crew or recover the helicopter. His people would be able to kill a large number of American soldiers. A second helicopter was shot down due to the massing of forces in the vicinity of the first crash site and the fact that the enemy force now believed that the US forces were vulnerable.

Events had slipped out of control for the commanders that were not on the battlefield in the streets of Somalia, but rather back watching from the JOC. Many individual acts of heroism were recorded in the efforts to assist other US forces that were in trouble. The other allied forces not in the original plan assembled to assist. These forces combined with the forces of the coalition partners, but were delayed as they worked out the operational details. Their arrival was not as timely as those involved in the firefight would have preferred, but eventually they assisted in pulling the forces out of the city. After a long night of battle, 18 Americans were dead and over 70 more were wounded in action. Aidid's plan was a total success even though several thousand Somalis were killed in the ensuing firefight. As a result of this sequence of events President Clinton pulled out all of the US forces from Somalia. Modern C2 systems did not reduce American casualties and directly contributed to this disaster.

**Real-time video analysis**

Historically, intelligence analysis happens in the battlespace prep phase before the outbreak of hostilities, and is then revisited once hostilities commence. Any changes of the original estimate are revised and the updated intelligence is analyzed and disseminated. In this case with real-time intelligence, the commanders thought they could control the events as they were happening rather than taking a more traditional approach. Certain aspects of the C2 overhead coverage were useful during the pre-hostilities planning. A prime example was when initial word was passed to prepare to execute the plan. Team leaders used instant photos that were relayed from the observation birds to update enemy force disposition. The plan discussed exactly how to storm the building and where ranger-blocking positions would be and

then distributed this information to all of the team leaders. After the first helicopter was shot down, the real-time intelligence had limited value for the man in the field or the headquarters. Instead of accelerating the speed of command it accelerated the speed of friction in the battle.

**Contribution of intelligence and C2 to the outcome**

The outcome of this operation seemed to be predetermined. The SPECOPS forces of the United States were not planning to be stopped by a popular militia force. The main discussion point was rather how many lives would be lost to this cause. Intelligence allowed the operators to prepare for battle, but failed in the timely analysis and dissemination of information as the battle was taking place. Some may argue that this was not an intelligence failure, but rather a failure of the command and control network that was in place for the operation. The reliance of real-time video to the JOC provided a false sense of security that the operations were under control. When it became evident that the opposite was true, there were not viable alternative plans to reevaluate the progress of the operation.

**Lessons learned for future operational commanders**

In a Department of Defense news briefing 31 AUG 93, spokesman Kathleen deLaski discussed the topic: "Rangers in Somalia used the best intelligence available." The US Army Ranger unit in Somalia was "operating with the best intelligence that it had at the time" when it raided a building in south Mogadishu on August 30th. The building was thought to be the hiding place of members of a Somali faction, deLaski said. "Intelligence in a place like Mogadishu is not going to be perfect, but because it's perishable it has to be acted upon quickly. They reacted as they best saw fit when they entered the building and found only UN personnel there, " the spokesman asserted. [12] This briefing provided the first intelligence lesson from this operation in August. It set the stage for the events that would take place in early October. Lessons learned were abundant from this battle. The primary focus from the intelligence point of view centered on connectivity and the use of real-time battle video.

Joint military forces need a common battle picture and a communication plan that has the proper forces talking to each other. In this operation, the connectivity path from the real-time video aircraft into the JOC and not the field operator, made the directions that were relayed worthless. The special forces

units had their tactics and procedures organized for a one-hour takedown of the original objective. Command and control was not sufficient for improvising once the battle did not go according to the plans. This may be the function of elite units that were used to adapting to any situation, but when forces from different commands were compiled together, fog and friction were bound to enter the battlefield. The command and control from both the air and ground centers did not or could not control the events once they got out of control. Real-time video can provide situational awareness to those that need the intelligence for battle decisions, if organized and utilized properly. If the operational commander had been performing his functions in the traditional manner he would have been providing guidance and intent, not battlefield direction of forces. Real-time video has practical applications but it does not replace the traditional operational commander's functions and can confuse the commander in the heat of battle.

## ***OPERATION ALLIED FORCE***

Since 1993, numerous advances in technology and operational procedures have taken place. The situation and theater are entirely different from the Mogadishu example, but challenges with fog and friction in battle remain. This recent military operation yields some of the same principle lessons learned. Setting the stage once again with the operational overview, then shifting into a detailed focus on the Flex Targeting cell, one can see the practical application where the impact of emerging technology is most critical.

### Overview

On 24 March 1999, NATO forces began air operations over the Federal Republic of Yugoslavia. The campaign over Kosovo was not a traditional military conflict. There was no direct clash of massed military forces in OPERATION ALLIED FORCE. Air assets were the primary instruments of the military operations. President Milosevic was unable to challenge superior allied military capabilities directly. Therefore, he chose to fight chiefly through indirect means: use of terror tactics against Kosovar civilians; attempts to exploit the premium the alliance placed on minimizing civilian casualties and collateral damage; creation of enormous refugee flows to create a humanitarian crisis; and the conduct of

misinformation and propaganda campaigns. Milosevic's military forces were forced into hiding throughout most of the campaign, staying in caves and tunnels and under the cover of forest, village, or weather. He was forced to husband his antiaircraft missile defenses to sustain his challenge to our air campaign. He chose his tactics in the hope of exploiting our legitimate political concerns about target selection, collateral damage, and conducting military operations against enemy forces intermingled with civilian refugees. At the outset of the air campaign, NATO set specific strategic objectives for its use of force in Kosovo that later served as the basis for its stated conditions to Milosevic for stopping the bombing. These objectives were to:

1). Demonstrate the seriousness of NATO's opposition to Belgrade's aggression in the Balkans;

2). Deter Milosevic from continuing and escalating his attacks on helpless civilians and to create conditions to reverse his ethnic cleansing; and

3). Damage Serbia's capacity to wage war against Kosovo in the future or spread the war to neighbors by diminishing or degrading its ability to wage military operations. [13]

To accomplish these objectives, the operational commander utilized all available assets and sensors to prepare and shape his theater of operation. Real-time video from numerous assets were key to the situational awareness in the Combined Air Operations Center (CAOC) in Vincenza, Italy. This center was responsible for the day to day operations. The CAOC served as the operational commander's direct link to the battlefield. The Flex Targeting cell provided the operational commander his view of the battlefield. The impact of emerging technology can best be encapsulated by analyzing the action of this cell and the practical application of these evolving systems.

**Flex Targeting**

Coordinating efforts of each service's ISR assets centered in the Flex Targeting cell in the CAOC. Real-time video was displayed through the Unmanned Aerial Vehicle (UAV) programs of Predator, Pioneer and Hunter. Other platforms contributed significantly including the E-8 Joint Surveillance Target Attack Radar System (JSTARS), the U-2, the MPA AIP platform (similar to those from Somalia operation) and the Real-time Information in the Cockpit (RTIC) ground stations. Coordinating the

combined efforts of these sensors for the command and control cell were operators serving as filters of information. The operators analyzed the data from raw video prior to the operational commander's utilization. Differences of opinions varied for correct procedure and doctrine usage of these combined sensors, yet the operational commander's agent was not involved in the loop until his presence was required. One interesting difference centered on the JSTARS usage. It is important to note that the operational level decision-maker was not effected by this difference. The lower echelon of command was correctly utilized and allowed the operational commander to focus on his traditional functions.

The Army and Air Force have greatly differing views of the JSTARS applications. The Army has proven that JSTARS can be a highly effective intelligence tool. Ground station operators' analytical skills on patterns and trends greatly enhance the ground commander's view of the current battlefield and enemy's intent. By using this analysis process in conjunction with real-time video, the operators can predict the enemy's movements and behavior thus, identifying possible choke points and potential avenues of approach. Additionally, analysis of JSTARS data can identify important details of the enemy's operating patterns, such as supply routes and logistical points. This combination gives the ground commander a more complete view of the enemy's weaknesses. One detraction from this application of JSTARS is that it cannot independently confirm or deny specific activity based on moving target indicators (MTIs) alone. The activity must be cross-cued with other live feed sources to give a complete and accurate view of the battlefield.

In ALLIED FORCE, this doctrinal approach directly supported the commander of Task Force (TF) Hawk. The ground stations collocated with the TF, provided real-time intelligence along lines of communication and during the continuous realignment of Serbian forces. Use of this intelligence both enhanced and supported information from other imagery intelligence as well as signals intelligence sources. Cross-cueing with the Hunter UAV proved vital in supporting the intelligence gathered from JSTARS.

The Air Force on the other hand, views the system as a battlefield management tool designed to provide immediate and direct support to the Air Commander. Working very closely with Air Force and Army aircraft flying in the area of interest, the JSTARS aircrew could immediately identify movements on the battlefield and cue those aircraft to the vicinity of this activity. The aircrew of the E-8 JSTARS aircraft

was able to keep a tight watch on enemy movements and thus provide essential data as to the speed, direction, and total size of enemy MTIs. [14]

From this coordination of sensors, the cell could consolidate the intelligence picture and provide pertinent analysis to the decision-makers. This evolution of sensor technology coordination provides valuable insights to the commander, as long as the proper filtering of information takes place. The Flex Targeting cell fused the real-time video with SAR and IR photos from all of the theater and national sensors. Real-time video was the means of cross-cueing other intelligence products.

**ALLIED FORCE Real-time Video in Action**

On 14 April 1999, the Flex Targeting cell was conducting standard ISR operations with all of the sensors that were available in theater. Each of the sensors was providing their unique piece to fuse the battlespace picture together. An Allied fighter aircraft spotted a large convoy on the road and proceeded to investigate. The high speed of approach made it difficult to identify any distinguishing features of the convoy so the Flex Targeting cell directed the UAV to provide video into the cell for analysis. The concern was to determine if the convoy had military significance or strictly humanitarian purposes. The CINC's staff in charge of executing the operation could then analyze the situation and provide guidance into the field that was requested by the operator. In hindsight, watching the real-time video of the convoy did not provide perfect clarity and vision for the proper actions, yet it provided situational awareness that assisted in making the required decisions. The video combined with radio communications from the fighter aircraft, presented the decision-makers with the fact that ammunition rounds were being fired at the aircraft. The order to fire upon the convoy was executed and carried out. This example was reported in a NATO Headquarters Press conference speech, 19 April 1999.

> **April 14** -- Yugoslavia claims that rockets fired by allied jets killed 75 people in two separate refugee columns. NATO later admits accidentally hitting a civilian vehicle. [15]

As evident from this press release, the fog and friction of war were not eliminated. Real-time video assisted in providing situational awareness, but did not provide the complete answer. Although not perfect, this is just one example of how real-time video in action can enhance capabilities to assist the challenges present for today's decision makers. During the Kosovo conflict, video provided the necessary situational

awareness for those involved, but did not interfere or add to the confusion of the operation, as could be the conclusion from the Somalia operations. When utilized in a value-added scenario this technological advantage had tactical and operational significance.

## ***Future Perspective***

To understand the future, it is of value to first look into the past. In the past, the United States has often relied on technological silver bullets, sometimes with disastrous effects. In the 1930's strategic bombing promised to end a war from a distance, pounding the enemy into submission before one soldier had to advance. World War II proved this statement to be inaccurate. By 1950 the atomic bomb was thought to make any invasion by large land forces impossible. Korea proved this wrong. In the 1960's a high tech electronic barrier intended to stop infiltration into South Vietnam as bombing critical targets in the north dissuaded Hanoi from pursuing the conflict. North Vietnam proved this wrong. In 1991 some believed that a month-long intensive precision bombardment of Iraqi troops would force them to withdraw from Kuwait without a land campaign. This was once again proved to be wrong. [16] Today, the discussion that the emergence of real-time video technological advances will change the time tested functions of intelligence and operational C2 is the philosophy yet to be proved.

Future growth of real-time video products at every level of command, from the operator in his cockpit, in the field, or to the sub-unified staff through the CINC, all the way to the NCA in Washington is entirely realistic. Centralized direction with decentralized execution has been the historic approach to operational command and control. This approach is a foundation of the military culture. With instant information many people believe that layers of command could be removed from the current military structure. This pure economic argument fails to approach the significance of the operational commander that provides the link from the strategic level of national power to the tactical level operator. The significance of the operational commander requirements for command and control throughout the spectrum of conflict can not be captured in real-time video displayed at the NCA level. The continuous task of shaping his theater with trained forces that understand the unique environment has not been replaced by the instantaneous transfer of information.

## ***Recommendations***

With all of the recent discussions on the topic of Network Centric Warfare or Battlefield Digitalization and the requirement to have instant intelligence, the above case studies put things into perspective. Two main recommendations can be summarized from this research:

1) Technological advances should be aggressively researched and developed with special attention as to what level of command the technology should be applied.
2) Value-added checks and balances need to be institutionalized prior to application.

The RTIC program, mentioned in the Flex Targeting section above, is a solid example of proper utilization of real-time video technological advances at the appropriate level. The RTIC program provides real-time imagery and text targeting information into the cockpit of strike aircraft. The information may be provided over Link 16, or by SATCOM. The overall purpose of this program is to survey, develop, and implement capabilities along with the procedures to provide RTIC to strike aircraft. The benefits of RTIC have been demonstrated and the capability is expanding to various operational platforms. RTIC must be developed and expanded in such a way to ensure that communications resources, or other missions are not seriously impacted. [17] This is an attempt to shorten the sensor to shooter timeline and can easily be tapped off for a live feed into the operational commanders command center. The overall efforts are still concentrated on the cockpit, thus realizing the need to keep the information at the correct utilization level and allowing the operational commander to perform in a traditional manner. The CAOC in OPERATION ALLIED FORCE monitored RTIC ground stations but did not interfere or micromanage RTIC operations.

Janes Defense Weekly (JDW) reported that the efforts still have a long way to go before making an impact to the operational commander. Significant strides have been made in data dissemination and the acceleration of time between locating targets and weapons delivery. This was demonstrated by the lone launch of a Tomahawk Land-Attack Missile early in the Kosovo campaign immediately after it was learned a Serb MiG-29 was out in the open at a Yugoslav airbase. However, officials interviewed by JDW said US and allied forces remain unable to instantaneously provide "shooters" with radar images and other intelligence gathered by the plethora of allied surveillance and reconnaissance assets and spy satellites.

Real-time targeting as well as real-time battle-damage assessment has been a top priority for Department of Defense and other military planners. This is focused on dealing with mobile surface-to-air missile batteries and other assets that can be moved very quickly. "We learned our lessons in the Gulf War but not well enough," said one intelligence officer. From target identification to weapons delivery, he said, "three to four hours is the best we can do."[18] The challenges in emerging technologies grow along with the advances of each new system. A concentration on which level of command should be impacted by this new technological growth needs to be the prime focus.

The second recommendation revolves around the requirement that the operational commander must ensure that value is added to the situation by utilizing technology and not simply using emerging technology because it is available. In Mogadishu, the firefight did not proceed as planned based on the original intelligence estimates. Confusion was compounded even further with the observation birds in the sky. Instant intelligence and real-time video have had many positive results in military operations since the time of this battle. This has been primarily on planning and assimilation of information not battlefield direction. If the real-time data was providing a different viewpoint into the command and control helicopter or piped into an easily transported mini view screen to the SPECOPS units on the ground, then it would be a great value-added asset to the battle. It would have been providing intelligence to the operator rather than to the operational commander. This is relevant since the operational commander has no practical application for the information. Providing unfiltered information to the general in the JOC did not add any value to the conflict. Technology needs to be a value-added product to the commander. If the communication links had been worked out to have all platforms connected, the JOC would not have needed to see the battle live. This real-time video was an added feature of 21st century technology not being utilized in a combat efficient form.

The Battle of Mogadishu illustrates the need for operational commanders to provide guidance to those forces on the front line and then step back and allow them to perform the assigned mission. Proper analysis of events could have produced a different outcome in Somalia and will continue to be important in the future. Planning on worst case estimates along with connectivity and situational awareness to all players on the battlefield, will be lessons that are highlighted from Somalia but will have lasting impact on future operations. The emerging technology of today will provide a battlefield awareness that is not

comprehensible from the perspective of past military leaders. However, from the seat of the operational commander his actions should not be much different. If the leader sitting back in an operations center wants to see the battle real-time there is no better substitute than a front row seat on the battlefield.

## ***Conclusions***

Today's military leaders are realizing the mixed-value dimension to technological advances. The Wall Street Journal reported earlier this month on the Chairman of the Joint Chiefs of Staff's order to reduce the "bells and whistles of power point presentations and just get to the point."[19] It seems that the traditional ways of briefing the commander have changed to fancy power point presentations that do not necessarily have value that is commensurate with the cost of time and space for those involved. This example draws comparison to the real-time video discussion. Yet to date, power point briefs have not had an effect on combat operations. It is only a matter of time before this problem expands by slowing down critical communications between headquarters and the units in the field due to the limitations of bandwidth of the classified systems. Power point presentations like real-time video have many advantages over the past methods, yet when not held in balance, the costs can outweigh the benefits. The situational awareness factor combined with the value added litmus check must constantly be reevaluated and monitored.

Although concentrating primarily on intelligence and C2, the above recommendations are valid throughout the full range of functions of the operational commander. The operational commander that practices centralized direction and decentralized execution can provide the strategy and guidance to his subordinates. It is imperative to remember that war is a political act. It is also essentially linked to human nature, which doesn't change as fast or often as technology. We cannot eliminate the irrational aspects of war through a purely technical solution. Technology cannot overcome the greed, hate, fear, revenge, or other emotions that enter into war.[20]

Emerging technological advances of today's military should not be discarded simply for the sake of keeping the status quo. The advances should be evaluated and applied at the appropriate level once a value-added determination has been assessed.

NOTES

[1] Eric Shinseki, "Kosovo: Operation Allied Force", Military Intelligence Professional Bulletin, Jan-Mar 2000, p1.

[2] Navy Department, Forward ... From the Sea, Washington: September 1994.

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